

Components of the Immune System

One of the funny things about the immune system is that it has been working inside your body your entire life but you probably know almost nothing about it. For example, you are probably aware that inside your chest you have an organ called a "heart". Who doesn't know that they have a heart? You have probably also heard about the fact that you have lungs and a liver and kidneys. But have you even heard about your thymus? There's a good chance you don't even know that you have a thymus, yet its there in your chest right next to your heart. There are many other parts of the immune system that are just as obscure, so let's start by learning about all of the parts.

The most obvious part of the immune system is what you can see. For example, [skin](#) is an important part of the immune system. It acts as a primary boundary between germs and your body. Part of your skin's job is to act as a barrier in much the same way we use plastic wrap to protect food. Skin is tough and generally impermeable to bacteria and viruses. The epidermis contains special cells called Langerhans cells (mixed in with the [melanocytes](#) in the basal layer) that are an important early-warning component in the immune system. The skin also secretes antibacterial substances. These substances explain why you don't wake up in the morning with a layer of mold growing on your skin -- most bacteria and spores that land on the skin die quickly.

Your nose, mouth and eyes are also obvious entry points for germs. Tears and mucus contain an enzyme (lysozyme) that breaks down the cell wall of many bacteria. Saliva is also anti-bacterial. Since the nasal passage and lungs are coated in mucus, many germs not killed immediately are trapped in the mucus and soon swallowed. Mast cells also line the nasal passages, throat, lungs and skin. Any bacteria or virus that wants to gain entry to your body must first make it past these defenses.

Once inside the body, a germ deals with the immune system at a different level. The major components of the immune system are:

- Thymus

- Spleen
- Lymph system
- Bone marrow
- White blood cells
- Antibodies
- Complement system
- Hormones

Let's look at each of these components in detail.

The lymph system is most familiar to people because doctors and mothers often check for "swollen lymph nodes" in the neck. It turns out that the lymph nodes are just one part of a system that extends throughout your body in much the same way your blood vessels do. The main difference between the blood flowing in the circulatory system and the lymph flowing in the lymph system is that blood is pressurized by the heart, while the lymph system is passive. There is no "lymph pump" like there is a "blood pump" (the [heart](#)). Instead, fluids ooze into the lymph system and get pushed by normal body and muscle motion to the lymph nodes. This is very much like the water and sewer systems in a community. Water is actively pressurized, while sewage is passive and flows by gravity.

Lymph is a clearish liquid that bathes the cells with water and nutrients. Lymph is blood plasma -- the liquid that makes up blood minus the red and white cells. Think about it -- each cell does not have its own private blood vessel feeding it, yet it has to get food, water, and oxygen to survive. Blood transfers these materials to the lymph through the capillary walls, and lymph carries it to the [cells](#). The cells also produce proteins and waste products and the lymph absorbs these products and carries them away. Any random bacteria that enter the body also find their way into this inter-cell fluid. One job of the lymph system is to drain and filter these fluids to detect and remove the bacteria. Small lymph vessels collect the liquid and move it toward larger vessels so that the fluid finally arrives at the lymph nodes for processing.

Lymph nodes contain filtering tissue and a large number of lymph cells. When fighting certain bacterial infections, the lymph nodes swell with bacteria and the cells fighting the bacteria, to the point where you can actually feel them. Swollen lymph nodes are therefore a good indication that you have an infection of some sort.

Once lymph has been filtered through the lymph nodes it re-enters the bloodstream.